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**Notice of Allowability**

Application No.

10/672,246

Examiner

John H. Le

Applicant(s)

KIM, JUNG PILL

Art Unit

2863

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant's amendment filed 03/10/2005.
2. ☒ The allowed claim(s) is/are 1-20.
3. ☒ The drawings filed on 25 September 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |  |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment                               |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material          | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance   |
|   | 9. <input type="checkbox"/> Other _____.   |

***Response to Amendment***

1. Applicant's amendment filed 03/10/2005 has been entered and carefully considered.

Claims 2, 6-8, and 18 have been amended.

Claim 20 has been added.

***Reasons for Allowance***

2. Claims 1-20 are allowed.

3. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1, none of the prior art of record teaches or suggests the combination of a random access memory device including a temperature sensing circuit, the temperature sensing circuit comprising: a sensing device configured to hold a sensed voltage that varies with changes in temperature at the sensing device; a first comparator configured to receive the sensed voltage from the sensing device, the first comparator generating a first output signal; a second comparator configured to receive the sensed voltage from the sensing device, the second comparator generating a second output signal; a logic circuit configured to receive the first and second output signals; a first temperature reference circuit having a plurality of first reference voltages; a second temperature reference circuit having a plurality of second reference voltages; a first switch circuit coupled between the first temperature reference circuit and the first comparator, the first switch circuit controlled by the logic circuit such that a first reference voltage is applied to the first comparator; a second switch circuit coupled

between the second temperature reference circuit and the second comparator, the second switch circuit controlled by the logic circuit such that a second reference voltage is applied to the second comparator; a first trimmer coupled to the first temperature reference circuit, the first trimmer being adjustable to adjust the first reference voltage; and a second trimmer coupled to the second temperature reference circuit, the second trimmer being adjustable to adjust the second reference voltage. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 6, none of the prior art of record teaches or suggests the combination of a temperature sensing circuit, wherein the temperature sensing circuit comprising: a first and a second comparator each configured to receive a sense voltage that is indicative of a sensed temperature; a first temperature reference circuit having a plurality of first reference voltages coupled to the first comparator such that the plurality of first reference voltages are alternately compared with the sense voltage; a second temperature reference circuit having a plurality of second reference voltages coupled to the second comparator such that the plurality of second reference voltages are alternately compared with the sense voltage; a first trimmer coupled to the first temperature reference circuit and a second trimmer coupled to the second temperature reference circuit, the first and second trimmers being independently adjustable to adjust the plurality of first and second reference voltages. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found,

taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 15, none of the prior art of record teaches or suggests the combination of a method of decreasing current consumption in a dynamic memory device, wherein the method including the steps of: providing a semiconductor memory device with a temperature sensing circuit; periodically refreshing the memory device at a refresh rate; sensing the temperature of the dynamic memory device with the temperature sensing circuit and producing a corresponding sensed temperature voltage; providing a first reference voltage; comparing the sensed temperature voltage with the first reference voltage using a first comparator with a first offset voltage; providing a second reference voltage; comparing the sensed temperature voltage with the second reference voltage using a second comparator with a second offset voltage; determining whether the sensed temperature voltage is within the first and second reference voltages; adjusting the first reference voltage to balance the first input offset voltage of the first comparator; and adjusting the second reference voltage to balance the second input offset voltage of the second comparator. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 18, none of the prior art of record teaches or suggests the combination of a random access memory device, wherein the random access memory device comprising: a first and a second comparator each configured to receive a sense

voltage that is indicative of a sensed temperature; first means coupled to the first comparator for alternately comparing a plurality of first reference voltages with the sense voltage; second means coupled to the second comparator for alternately comparing a plurality of second reference voltages with the sense voltage; third means coupled to the first means for independently adjusting the plurality of first reference voltages; and fourth means coupled to the second means for independently adjusting the plurality of second reference voltages; and wherein a first reference voltage compared to the sense voltage and a second reference voltage compared to the sense voltage are different from each other so that a determination is performed that the sensed temperature is in a range defined by the first reference voltage and the second reference voltage. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 20, none of the prior art of record teaches or suggests the combination of a random access memory device, wherein the random access memory device comprising: a first and a second comparator each configured to receive a sense voltage that is indicative of a sensed temperature; a first temperature reference circuit having a plurality of first reference voltages coupled to the first comparator such that the plurality of first reference voltages are alternately compared with the sense voltage; a second temperature reference circuit having a plurality of second reference voltages coupled to the second comparator such that the plurality of second reference voltages are alternately compared with the sense voltage; a first trimmer coupled to the first

temperature reference circuit and a second trimmer coupled to the second temperature reference circuit, the first and second trimmers being independently adjustable to adjust the plurality of first and second reference voltages. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

#### ***Contact Information***

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John H Le whose telephone number is 571-272-2275. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Barlow can be reached on 571-272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John H. Le

Patent Examiner-Group 2863

March 30, 2005



MICHAEL NGHIEM  
PRIMARY EXAMINER